

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking)
into Distributed Generation.)
_____)

Rulemaking 99-10-025
(Filed October 21, 1999)

**RESPONSE OF SAN DIEGO GAS & ELECTRIC COMPANY (U 902-M)
TO QUESTIONS FOR THE SITING COMMITTEE WORKSHOP ON
INTERCONNECTION RULES**

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I. Scope of technologies to be considered for standard interconnection rules

- A. What size range of generating technologies should be applicable to the interconnection rules being considered in this proceeding?
- The interconnection rules should cover all size ranges up to 20 Mw.
- B. Should interconnection rules differ based on size range and technology? If so, how?
- Yes. Protection requirements will vary by size. Additionally, static inverters need to be certified or listed, something not required today for most parallel generation.
- C. Should electricity storage technologies be considered also? If so, what types should be considered?
- Yes. Any type of generation/power source up to 20 Mw operating in parallel with a utility grid must meet the interconnection requirements considered in this proceeding.
- D. Should the standards be independent of the mode of operation? In other words, should the same standards apply whether the intended function is for emergency or back-up use only versus primary use? Should any standards apply to an islanded mode?
- Interconnection guidelines are dependent on whether the generator operates in a standby/emergency mode versus in a primary/parallel mode. Today, Rule 21 indicates that design and operating guidelines are different for separate systems and those that operate in parallel with the utility. Parallel system requirements are indicated in Rule 21 and the Interconnection Guidelines for Non-utility Generation. Separate systems are those that cannot operate in parallel with the utility and are typically used as standby/emergency. For separate systems, the protection requirements are normally based on customer, manufacturer and local code requirements. For separate systems, the utility's main

requirement is that parallel operation cannot occur. In reference to islanding, the Interconnection Guidelines are designed to prevent islanding, other than for that customer's own load.

E. Should the same standards apply to new installations versus retrofit of existing self-generators or emergency generators?

- Yes. The same standards should apply regardless if a new installation or retrofit.

F. What options should end-users have in terms of choice of interconnection voltage levels, and what are the consequences of these choices?

- The voltage level should be established based on Rule 2. Consideration is given to Mw size, location, and/or available system capacity.
- The customer should pay for the costs incurred by the utility to make this interconnection.

G. Are there utility-specific conditions that preclude the application of a single standard?

- It appears that for radial distribution systems a single statewide interconnection standard is feasible. This can be confirmed through the workshop process.

H. The CPUC OIR excludes interconnection rules to the transmission side. Is there any need to revisit this decision? Can it be applied without exceptions?

- Transmission interconnection policies are now governed by the ISO and FERC. There is no need for this investigation to consider transmission interconnection requirements.
- At high Mw levels of generation, such as 20Mw, interconnection directly to the distribution grid may be a problem. In these instances, interconnection at a transmission voltage may be appropriate.

II. Need for California standards and replacement by national standards

A. Which states have made similar efforts to develop interconnection standards? What is the scope of these efforts? To what extent can the work of other states (e.g., Texas and New York) serve as useful starting points for this effort?

- Texas and New York have been working on interconnection guidelines. It can be expected that other utilities are in some stage of the same process.
- All known efforts in these states should be reviewed for usefulness and applicability for California.

- B. What efforts have been made within the state to develop a California consensus on interconnection standards?
- All UDCs currently have interconnection standards in conjunction with Rule 21 and there is general similarity between these rules. These rules should be the starting point for developing consensus on a statewide standard. Recently, SDG&E has had discussions with ESPs, manufacturers, and other UDCs on interconnection requirements. It is important that implementation of the rules also be applied in a standardized fashion.
- C. What is the scope and timing of the IEEE P1547 Distributed Resources Interconnection Standard Working Group?
- IEEE P1547 is intended to provide a uniform standard for interconnection of distributed resources with electric power systems. It will provide requirements relevant to the performance, operation, testing, safety considerations and maintenance of the interconnection. The final acceptance is not expected until at least late 2001.
- D. To what extent do California utilities, manufacturers, and other interested parties participate in the IEEE P1547 Working Group process? How would the development of interim standards in California affect the progress of the IEEE P1547 effort and its representation by California entities?
- SDG&E has been monitoring the results of the IEEE P1547 Working Group. With the opening of the OIR, SDG&E will increase its activity in the development of IEEE P1547.
 - The guidelines adopted by California should be consistent with the approach of IEEE P1547. California should take an active role in the development of IEEE P1547.
- E. Can interim standards developed in California be considered effectively in the IEEE P1547 effort?
- See response to D.
- F. How would interim standards be adopted and enforced in California? Should they apply to public utilities as well as the CPUC-regulated utilities?
- The standards would be utilized and enforced by the utilities similar to the current interconnection rules. Parties not in compliance with standards would eventually be disconnected from the grid, with possible additional legal/financial consequences.
 - In an ideal world, the standards should apply to all utilities.
- I. What are the mechanics for replacing interim California standards with national standards (i.e., IEEE P1547)?

- After IEEE 1547 is formally accepted, all interested parties would need to reconvene to gain consensus. With good participation during the IEEE P1547 development, this consensus building would be facilitated.

III. Safety issues

A. What are the major safety issues associated with DG interconnection?

- Possibility of Backfeed/Islanding- Would result in a safety hazard to line employees, other emergency response workers, or the public by energizing facilities expected to be de-energized. Additionally, when service is restored, a fault may occur due to the systems not being synchronized.
- Fault duty being exceeded- Utility equipment could be overstressed, resulting in violent failures.
- Overloaded conductor sagging into other facilities due to DG not being on-line when expected would result in high voltage hazard to the public and a fire risk.
- Other issues to consider are as follows:

Reliability

- Prevention of outages due to overloads- Overloads would cause an outage either due to line/equipment failure or by dropping load to prevent equipment failure.
- Steady State voltage — Voltage must be evaluated to prevent either high or low voltage outside of the allowable limits.
- Var management — Customer power factor must be managed to ensure the customer power factor is as required within Rule 21. Poor power factor can result in loading and voltage problems, as well as overall system stability concerns.
- Fuse/Relay coordination — Reverse power flow requires that upstream protective devices be evaluated to ensure they operate as intended to provide a safe and reliable system.
- Restoration / Post Islanding — When service is restored, a fault may occur due to the systems not being synchronized. Restoration efforts would be hampered by delays caused by increased coordination efforts to reconnect both electric systems.

Power Quality

- Flicker Constraints — Large DG systems at the end of long radial lines have been known to cause severe flicker.
- Harmonics — Severe harmonic content can interfere with service to adjacent customers. IEEE 519 provides requirements for new equipment. The utility will need to react when equipment exceeds these guidelines, thereby causing problems to customers on the same distribution system.
- Sags/Surges — The start up and shut down of large DG may result in excessive voltage fluctuations to adjacent customers.
- System performance during islanding — During an islanded condition, the utility no longer controls the frequency or voltage provided to these customers. While this is an accepted risk to the customer feeding his own load, it is not acceptable to impose this risk to other customers.

B. What safety characteristics/protective devices are required of the DG machinery itself?

- Requirements for the protection of the DG itself are dictated by industry standards and are under the jurisdictional control of the local inspection agencies. As indicated below, SDG&E requirements are listed in Interconnection Guidelines for Non-Utility Owned Generation .

C. What safety characteristics/protective devices are required for the interconnection device? Is there a need for a disconnect switch in every instance? If not, what criteria triggers the need for a disconnect switch?

- For SDG&E, Interconnection Guidelines for Non-Utility Owned Generation outlines the existing requirements. Disconnecting means are required on the line side of the meter and between the meter and the generation source. This can be accomplished with switches, load break elbows, cutouts or secondary breakers. Producer disconnects can also be used provided the switches meet with SDG&E s approval and SDG&E has preemptive control.

D. What installation testing procedures should be required? Is there a need for periodic retesting? If so, how often and by whom?

- Installation test procedures should be utilized to ensure the protection system performs as specified. These installation test procedures may be observed by the utility. Pre-certified package systems may be a viable approach to minimize cost and increase reliability of the systems. In addition, periodic self-testing procedures are another method that should be used to maintain safety and reliability.

IV. Feasibility of type testing

A. Should type testing be incorporated into the interim standards development process? If so, what factors should be considered in the development of standardized testing processes for various DG types?

- Yes. Type testing or listing should be required. The technology and size of the unit should be a consideration.

B. What entity(ies) should certify the equipment? Should self-certification by the equipment manufacturers be allowed?

- Independent laboratories such as Underwriters Labs currently perform testing/listing for this type of equipment. Self-certification must not be allowed given that there are nationally recognized laboratories to perform this testing.

V. Information and training to be provided to government agencies

A. What information and training should be provided to fire departments and emergency response personnel?

- Information on safety and how to handle emergency situations needs to be provided to all emergency response agencies. Existing practices for standby and QF generation should be reviewed for applicability.

B. What information and training should be provided to local building officials?

- Code compliance and safety information needs to be provided to local building officials.

C. What information should be provided to air quality districts?

- Air quality districts should be made aware of the potential development of the DG market. They should review their requirements based on a long-term view of DG.

D. What information should be provided to the CEC under its generator data regulations? (e.g., fuel type, capacity rating, location, etc.)

- Fuel type, capacity, location, expected operation mode, emissions impact and heat rate.

VI. CPUC Rule 21 changes

A. What changes are needed to Rule 21, (e.g., the elimination of qualifying facility (QF) distinctions?). Are complementary changes to other rules required?

- For SDG&E, Rule 21 allows non-utility owned generation to interconnect, regardless of the QF status. Instead, the QF requirement is addressed through the applicable rates. The AV rates permit non-QFs to interconnect. SDG&E has been working on a modification to the Interconnection Guidelines for Non-Utility Owned Generation to address the requirements for static inverters. All UDCs should have a similar standardized approach.
- B. What education and training efforts are required in order to process interconnection applications, should they occur in significant numbers?
- If a significant number of applications were received, manpower would be an issue. Employees would need to be trained on the interconnection contracts, protection requirements and evaluation of system impacts. Pre-certification and standard contracts would alleviate some of the concerns in this area.

VII. Advanced communications and metering to facilitate dispatch or scheduling

- A. What are the major issues surrounding DG-UDC communications and metering? To what extent can experience with the QF industry provide a useful framework?
- A primary issue is the establishment of guidelines on when communications, metering and control from a remote location will be required.
 - DGs that contract for distribution capacity benefits must have telemetering and dispatch. Dispatch would be scheduled, verbal, or remote.
 - QFs over 2 Mw currently are required to have the Mw and Mvar output telemetered to SDG&E's Energy Control Center. A similar technical process may be used for smaller DG.
- B. What protocols are needed to govern the dispatch of DG facilities?
- Generally, if the DG has contracted to provide system capacity, then some type of dispatch would be required. This dispatch may be either by contract, rate design or verbal/remote control.
- C. What type of hardware or functional requirements should be required?
- SDG&E does not currently have a definitive response to this question.
- D. Do larger-sized distributed generation facilities need ISO dispatchability?
- This is up to the ISO, but they have indicated that they do not want to control generation less than 10 Mw.
- E. Could ancillary functions be accomplished without utility distribution company dispatch?

- For short-term notice, verbal or remote dispatch may be the only way to have standby generation turned on. These details need to be worked out.

VIII. Contractual Issues surrounding interconnection rules

- A. To what extent can interconnection agreements be standardized? In what respects must they be customized?
 - The technical interconnection agreements can be standardized to a great extent. Non-standard agreements will often be based on a DG's special requests or requirements. Any potential T&D benefits would be site specific and require individual agreements.
- B. Are there any liability requirements to be included in the agreements? What is the current situation and what is the insurance industry's position?
 - Yes. The UDC is held harmless in the interconnection agreement. The insurance terms in the agreements are as dictated by the CPUC in past decisions.
- C. How can non-discriminatory implementation of the rules be maintained and enforced?
 - SDG&E implements its filed rules in a non-discriminatory fashion. Nevertheless, complaints can be filed with the CPUC.

IX. Procedural

- A. What is the best approach to develop standards in this proceeding?
 - The workshop process used for Direct Access would be helpful. First the major issues need to be identified and then divided into subgroups to be addressed.
- B. Should working groups be formed? If so, how many and how should the work be divided among several working groups?
 - Following is a proposal on subgroups:

Standards and Rules

- National/California Standards
- Pre-certification
- Rule 21 Changes
- Standard requirements in size, amount of load per circuit, fault duty
- Interconnection fees and studies

Operational Issues

- Safety
- Reliability/System Integrity
- Dispatch and Scheduling
- Information and Training

C. How long should it take to develop standards based on the work of other states?

- It is reasonable to expect that the interim standards can be completed in approximately six months. This is consistent with the schedule developed by the CPUC.

D. Can the schedule for interconnection rules adopted in CPUC R.99-10-025 be satisfied? What process of oversight and facilitation is appropriate to ensure that the schedule is satisfied?

- The schedule can be achieved. This will require a facilitator that is non-biased, reasonable, astute, and is knowledgeable of the DG issues.

E. If a working group process cannot provide consensus in the time available, what formal procedures should the Siting Committee employ to provide an opportunity for consideration?

- Consensus should be the goal of the working groups, however a vote may ultimately be required. To ensure that a safe and reliable system is maintained, the voting structure should be established to prevent the three UDCs from being consistently out voted by the multiple vendors and consultants that will also participate.

Respectfully submitted,

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